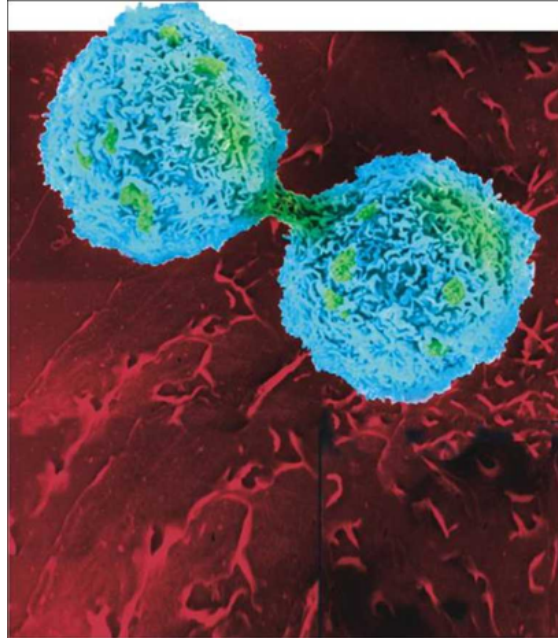


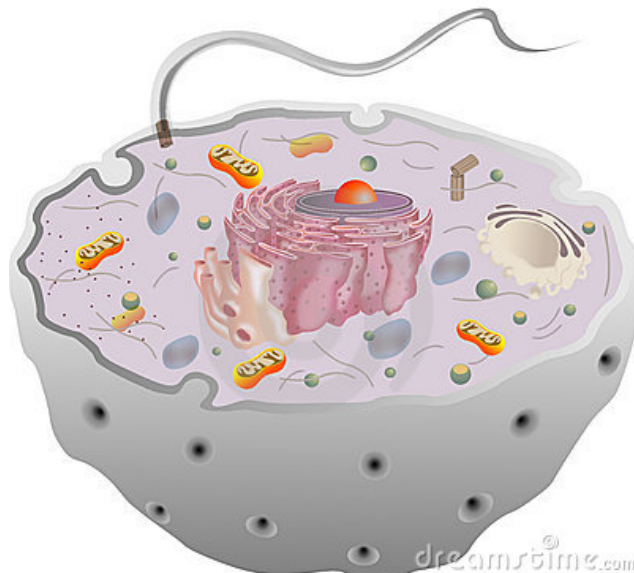
# Cell Division

## Chapter 10



## Why do cells Divide?

For growth, repair, and reproduction




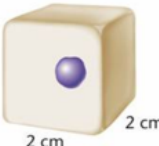
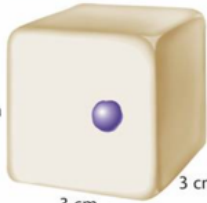
# When do cells divide?

## What happens when cells become too large?

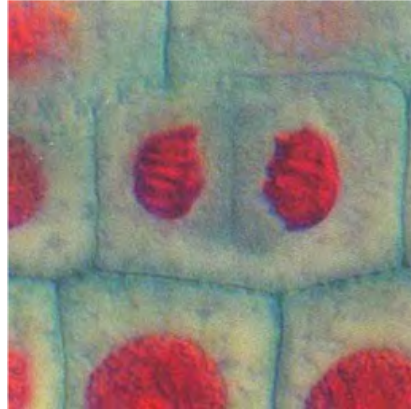
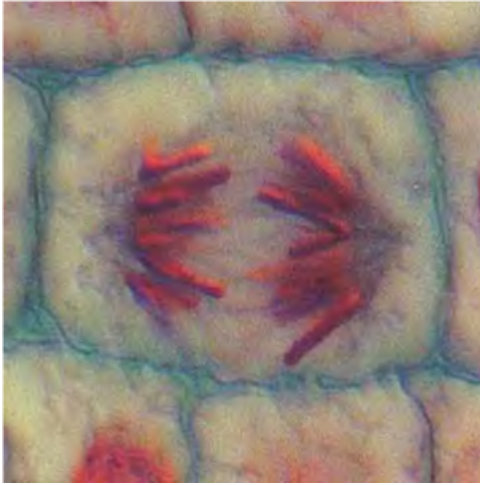


The larger a cell becomes, the more demands the cell places on its DNA.

The cell also has more trouble moving enough nutrients and wastes across the cell membrane

Ratio of Surface Area to Volume in Cells			
Cell Size			
Surface Area (length x width x 6)	$1\text{ cm} \times 1\text{ cm} \times 6 = 6\text{ cm}^2$	$2\text{ cm} \times 2\text{ cm} \times 6 = 24\text{ cm}^2$	$3\text{ cm} \times 3\text{ cm} \times 6 = 54\text{ cm}^2$
Volume (length x width x height)	$1\text{ cm} \times 1\text{ cm} \times 1\text{ cm} = 1\text{ cm}^3$	$2\text{ cm} \times 2\text{ cm} \times 2\text{ cm} = 8\text{ cm}^3$	$3\text{ cm} \times 3\text{ cm} \times 3\text{ cm} = 27\text{ cm}^3$
Ratio of Surface Area to Volume	$6 / 1 = 6 : 1$	$24 / 8 = 3 : 1$	$54 / 27 = 2 : 1$

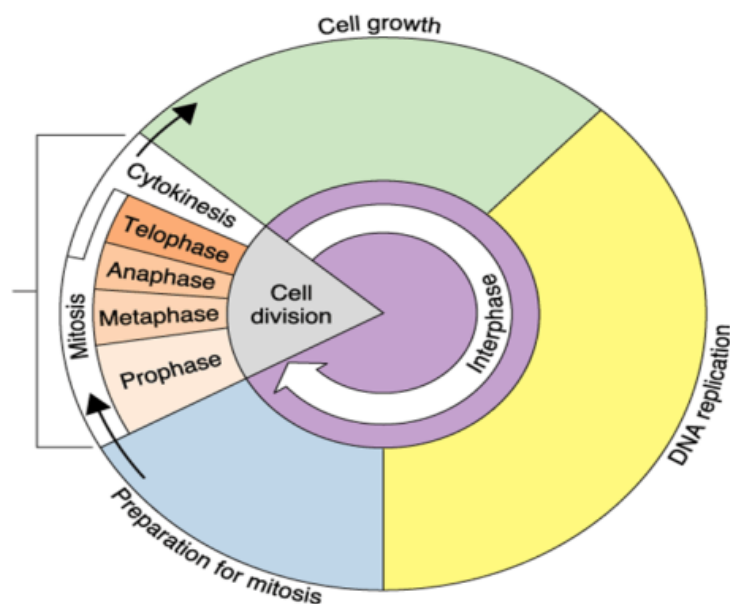
Before it becomes too large, a growing cell divides forming two “daughter” cells.



The process by which a cell divides into two new daughter cells is called **cell division**.

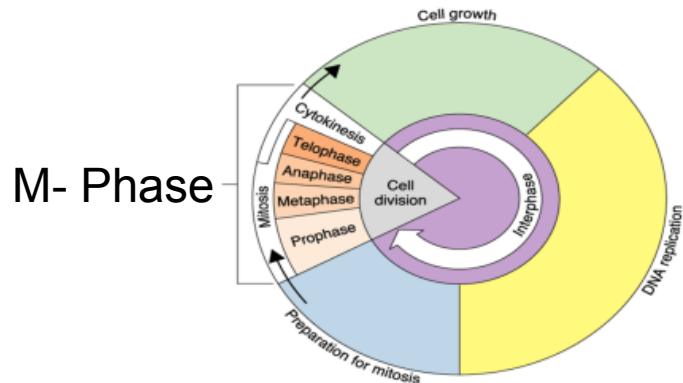
## **The Cell Cycle**

a series of events that cells go through as cells grow and divide



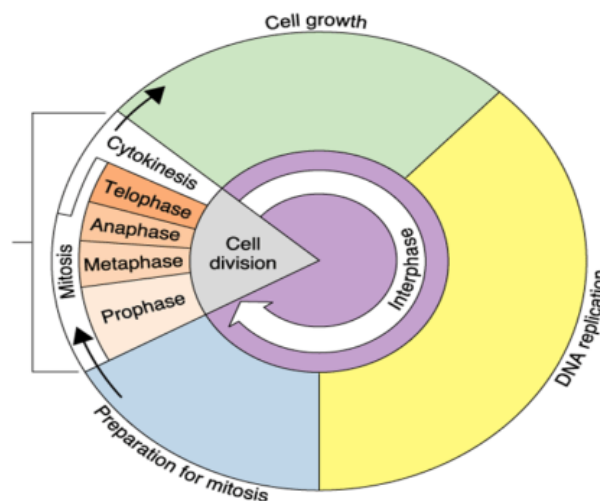
# *Cell cycle has two parts:*

1. Interphase- cell grows and prepares for division



2. Cell division- cell divides into two new daughter cells

## Phases of Interphase



- **G<sub>1</sub> phase**

Cell grows

- **S phase**

Replication of chromosomes/DNA synthesized

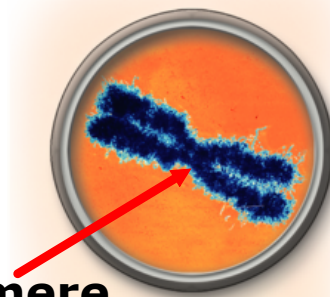
- **G<sub>2</sub> phase**

Organelles and molecules needed for cell division produced.

Before cell division, all of the DNA is replicated, or copied.

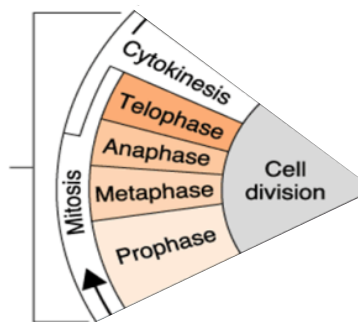
Each chromosome consists of two identical “sister” chromatids.

They are attached in the middle by a structure called a **centromere**.



In eukaryotes, cell division occurs in two major stages.

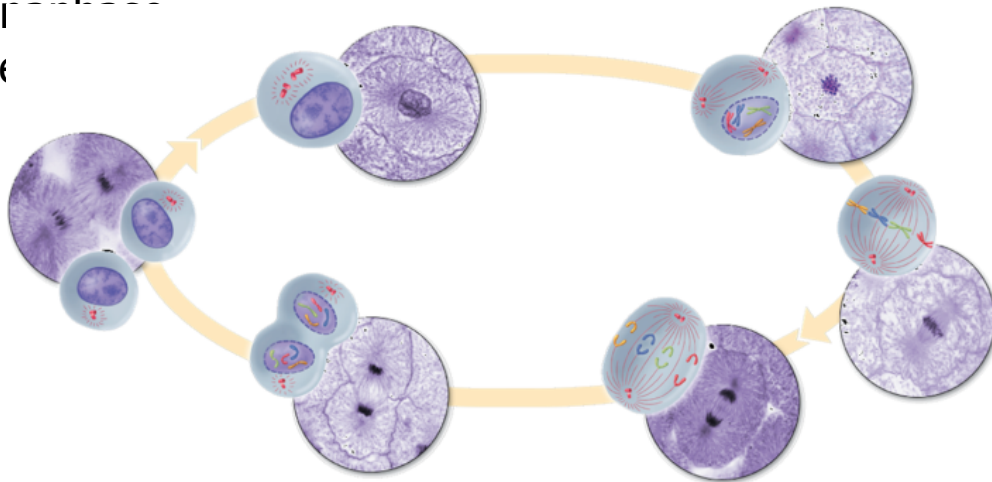
1. **Mitosis**- division of the cell nucleus
2. **Cytokinesis**- division of the cell cytoplasm



# Mitosis

The events of mitosis are divided into four phases:

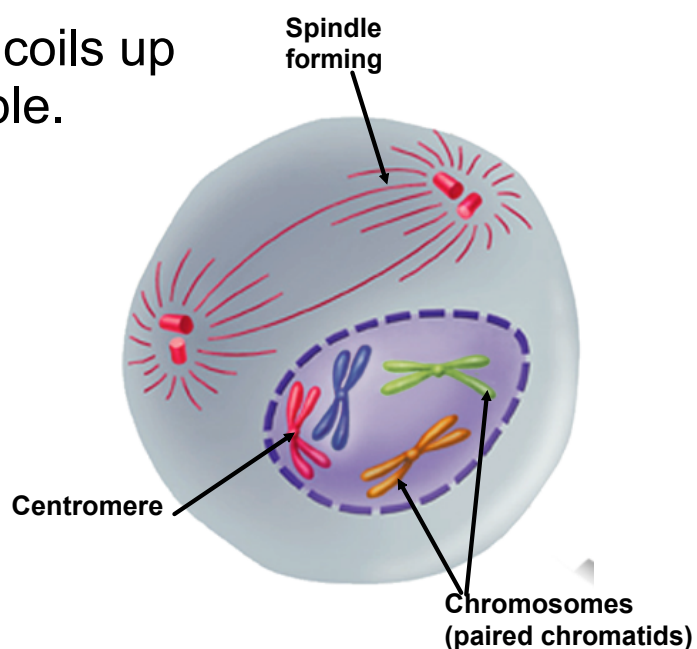
- Prophase
- Metaphase
- Anaphase
- Telophase



## Prophase

Prophase is the first and longest phase of mitosis.

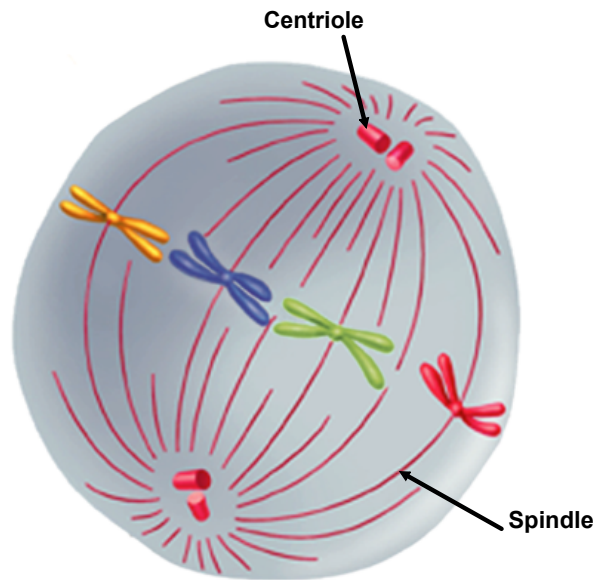
DNA (condenses) coils up and becomes visible.





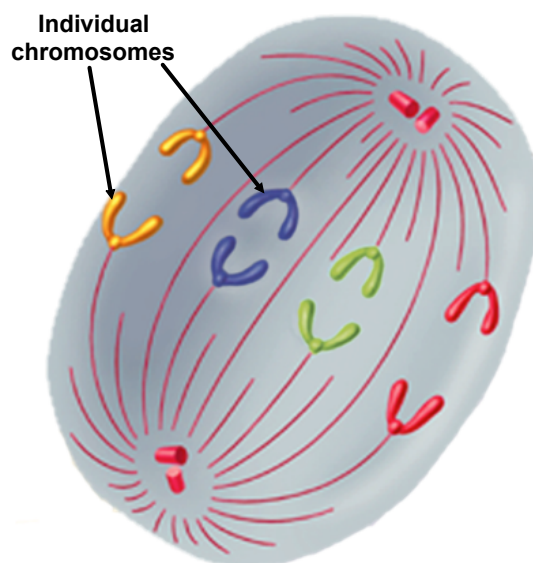
## Metaphase

The second phase of mitosis is metaphase. The chromosomes line up across the center of the cell.



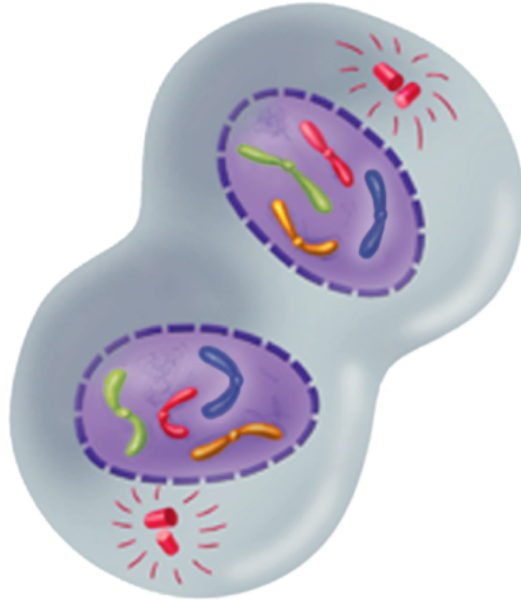
## Anaphase

Anaphase is the third phase of mitosis. The sister chromatids separate into individual chromosomes



## Telophase

Telophase is the fourth and final phase of mitosis. Chromosomes gather at opposite ends of the cell and lose their distinct shape.



## Cytokinesis

During **cytokinesis**, the cytoplasm pinches in half.

Each daughter cell has an identical set of duplicate chromosomes.





**How will I ever remember the phases?**

- **P**
- **M**
- **A**
- **T**